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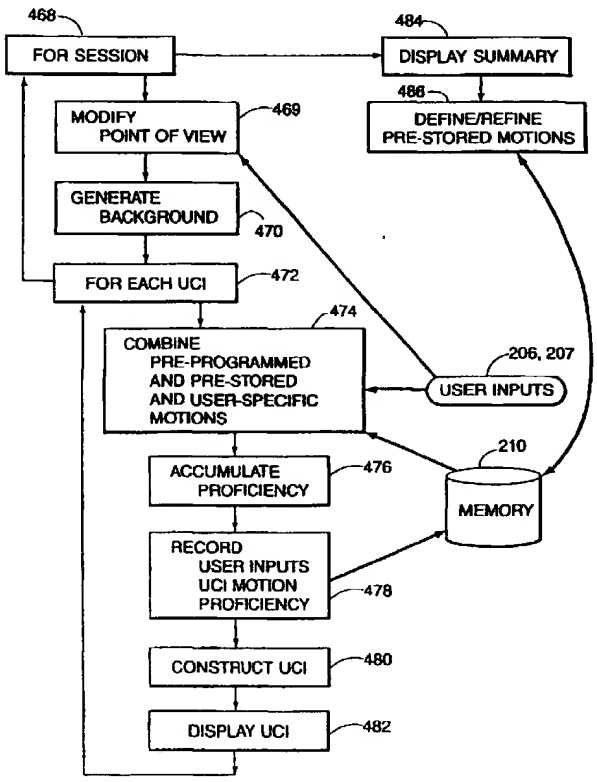
(54) Title: PROCESSING SYSTEM FOR INTERACTIVE, PERSONAL AND IDIOSYNCRATIC CONTROL OF IMAGES AND DEVICES



(57) Abstract: A processing system apparatus is arranged to receive user inputs differentiated from other users' inputs and to provide variable outputs which are individualized to each user. The processing system apparatus receives and processes inputs and displays images whose simulated physical movements are interactively controlled by each user's individual, personal, idiosyncratic inputs. The apparatus accepts such user-specific inputs into an "open" knowledge base and processes such inputs to produce user-specific, idiosyncratic outputs. In effect, the knowledge base learns from the user and the user learns from the feedback produced by the processing system apparatus. The processing system apparatus is further arranged so that as each user's successively transmitted inputs are received, its knowledge base stores and integrates such inputs so that outputs, in the form of simulated movements by user controllable images represent processed, idiosyncratic, updated and on-going inputs.

WO 01/90869 A1

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PROCESSING SYSTEM FOR INTERACTIVE, PERSONAL AND IDIOSYNCRATIC CONTROL OF IMAGES AND DEVICES

Background of the Invention

Physical movement has been the subject of technologies directed to: (1) videos and other visual and/or visualization means showing how to improve motor skills by practicing actual preferred examples of movement and (2) computer and video games using movements by displayed images that are activated by game players. Neither field of technology has combined the use of real and/or simulated demonstrative images, performing real and/or simulated movements in a simulated environment, interacted with by personally and idiosyncratically controlled user controllable images. Neither field of technology provides a means by which personalized artificial intelligence is developed in a processing system apparatus based upon user controllable images performing interactively controlled simulated movements, derived from personal and idiosyncratic user inputs.

In the present invention, user controllable images, and/or devices, upon receiving apparatus processed user inputs, "acquire" and "execute" personalized artificial intelligence in the areas of decision-making, motor skills and memory, by performing movements that are controlled by said user inputs. The processing system apparatus executing so as to receive

inputs (which are accepted or rejected) processes such data and produces outputs which represent displays of user controllable images. Accordingly, the present invention provides technical effects by the processing system apparatus which enable users to control user controllable images as personalized, on-screen agents which perform according to users' input controls.

User controllable image movements are controlled by user inputs, but without the user necessarily making the same or correlative physical movements as are displayed by the user controllable image or as are demonstrated by a demonstrative image (in an embodiment of the present invention displaying demonstrative images). Moreover, the present invention provides for technical effects in motivity-devices such that users interactively, personally and idiosyncratically control such user controllable motivity devices so as to cause said motivity devices to perform actual physical movements.

In computer and video game technologies, while some displayed images simulate physical movement, those images are activated by the user, for example, 10,000 game players, executing the same input activations will see 10,000 identical outputs, i.e. image movements. This makes sense in terms of providing entertainment to a mass audience. Similarly, in some expert systems computers mimic human know-how, but again the output process is not generated by user specific inputs, that are personal, idiosyncratic, interactive and capable of subsequent modifications, additions, deletions, updating,

feedback and so forth. Whereas computer and video games and some expert systems are directed to creating results that mimic humans and/or human movements, the present invention is directed to using the processing system apparatus as an open knowledge base providing individual users with the means to direct user controllable images to act as personal "intelligent agents". Such "agent" action is based on the specificity and nuances of controls from each individual user. Accordingly, processing system apparatus outputs will be differentiated among users and idiosyncratic to each, individual user since such outputs are produced by an "open" knowledge base which is dependent upon personal idiosyncratic user inputs.

The invention is as claimed in the claims.

A processing system apparatus according to the invention may be used to receive, accept or reject inputs, store, pre-store, maintain, modify and update inputs, pre-program parameters, feedback inputs and generate outputs, in the form of movements, that are particularized to each user. Simulated movement capabilities and limits (parameters) within the processing system apparatus are constructed so as to support user controllable images by providing for: 1) maintaining processing system memory of user transmitted personal, idiosyncratic input controls that cause simulated physical movement of the user controllable image,
2) updating capability of such maintained (user controllable image) memory, 3) modifications, deletions and additions to such updated memory, 4) retaining such memory as a knowledge base upon which subsequent, additional movement recordation, may be added, 5) allowing user review, i.e. causing the processing system to repeat prior, personal, idiosyncratic user input controls resulting in user controllable image movements, 6) selecting the dimensions and characteristics (i.e. parameters) of user controllable images, 7) allowing the user to select the speed of movement and control the sequential locationing of the user controllable image, 8) establishing pre-programmed user controllable image movement limitations (i.e. physical movement parameters), 9) using a pre-programmed model of movements within the processing system apparatus, to

measure user control of user controllable images, 10) establishing a means to decrease the error rate of user controllable image movement, 11) providing the user with control over the position and orientation of the user controllable image with respect to any axis, 12) allowing at least two user controllable images to interact with each other; and to so provide support in a variety of other ways and by other means.

The present invention is applicable to any user choosing to control any kind of user controllable image to simulate any physical movement in any simulated environment. The present invention may be used for learning, pre-training, amusement and the like. A user controllable image as a dinosaur may be caused to respond to the (predetermined) preferred physical movements of a demonstrative image of a dinosaur. The user controllable image as a bulldozer operator may be caused to simulate the movements of a demonstrative image operating a bulldozer in a preferred manner. A young child user learning to spell words may cause a user controllable image (in the form of one hand) to simulate the movement of alphabetized wooden blocks into a series so as to spell a word as is demonstrated by demonstrative image movements. In terms of the scope of the present invention, industrial, commercial, learning, amusement and sports are relevant areas for its application.

The present invention provides a processing system apparatus that enables displayed, user controllable images to

be controlled so as to perform simulated physical movements. Said movements are derived from each user's specific interactive, personal, idiosyncratic inputs to the apparatus. Accordingly, said apparatus provides means by which each user's specific input controls become, as the apparatus executes, the simulated decision-making, motor skills and memory capabilities, i.e. the effective, personalized "artificial intelligence" of her/his user controllable image.

In addition, on behalf of each user controllable image the processing system apparatus is enabled, to receive and accept (or reject) user inputs that add to, modify or delete said simulated, physical movements which is to say that the apparatus is arranged so as to be modified as it is used by each user (i.e. receives inputs and modifies its outputs on an on-going basis). As such, the present invention is well-suited to providing users, (for example, students, learners, players, customers and the like, i.e. individuals controlling the transmission of inputs) with on-screen agents that, based on user-specific inputs perform simulated anatomical movements, "decide" on tactics and strategies and are driven by memory that is specific to and directed by each, individual user.

In an example of one embodiment of the present invention a user views a display which shows, on the left half side of the screen, a demonstrative image performing a physical movement. On the right half side of the screen is a user controllable image which moves as the user transmits inputs

that cause the user controllable image to move. This simulated movement is personally and idiosyncratically directed by the user.

The user controllable image's simulated physical movements may, with respect to one or more demonstrative image(s) or another user controllable image(s), emulate the movements of said demonstrative images or cooperate with such movements or oppose them, or take some other form of movement (e.g. escape, ignore etc.). However, in all of these processes, there is a real time genesis of movement of the user controllable images, which is derived from the user. The user controllable image performs its "intelligent functions" as the on-screen, interactive, personal, idiosyncratic agent of the user.

The apparatus may also be embodied to provide such capabilities to motivity-devices such as robots, avatars or other motiles.

In the practice of the present invention, user controllable images do not simulate physical movements that are identical to one another. The timing, sequence, coordination, attitude (to an axis), force, balance, stride, trajectory swing and so forth of each user controllable image's simulated movements will be as differentiated as are the inputs of each user.

The combination of user-specific input interactivity with user controllable images, and personal and idiosyncratic inputs, represents a personalized artificial intelligence

within the apparatus, i.e. the derived decision-making, motor and memory skills of each user controllable image is transferred to a display which generates images and updates the display, on an on-going basis, to represent movement. This process provides a form of artificial intelligence (effectively, simulated decision-making, motor skills and memory) to the user controllable image (and motivity-devices) and further distinguishes the present invention from the prior art.

Particular features of the present invention may include:

(1) differentiated idiosyncratic inputs from each user,

(2) variable idiosyncratic outputs to each user,

(3) personal and idiosyncratic inputs forming individualized, integral components of the knowledge base within the processing system apparatus for each user,

(4) outputs specific to each user's directed input controls to each user controllable image,

(5) an open knowledge base that is updated based on successive additions, deletions and/or synchronously interwoven user-specific inputs,

(6) development of personalized artificial intelligence in the form of simulated "memory", "decision-making" and "motor skills",

(7) simulated learning by the open knowledge base, from user-specific inputs,

(8) learning by the user from feedback from the processing

system apparatus, and

(9) the processing system apparatus provides the capacity to users to create user-specific visual effects from user-specific inputs.

Brief Description of the Drawings

Drawings are not necessarily to scale, emphasis instead generally being placed upon illustrating the principles of the invention.

FIGs. 1 and 2 are pictorial diagrams of users interacting with embodiments of the invention.

FIG. 3 shows a user using a virtual reality input device.

FIG. 4 illustrates user control of a particular, simulated anatomical area.

FIG. 5 is a pictorial diagram of a user interacting with an alternative, opposing embodiment of the invention.

FIG. 6 shows a legless user controlling simulated legs

FIG. 7 shows an armless user controlling simulated arms.

FIGs. 8A and 8B contain pictorial diagrams of two users interacting with another alternative embodiment of the invention.

FIG. 9 is a schematic pictorial diagram of another alternative embodiment of the invention used in conjunction with the worldwide Internet.

FIG. 10 illustrates control of a previously living image.

FIG. 11 illustrates control of a mechanical system.

FIG. 12 shows user control of objects.

FIG. 13 is a block diagram of a processing system apparatus constructed according to the present invention.

FIGs. 14A-F contain flowcharts of the logical flow of the system of the present invention for preparation and operation of the processing system apparatus.

Detailed Description of the Invention

A processing system apparatus provides technical means to users to engage in activities relating to simulated movement. Purposeful movement involves no fewer steps than: perception, visualization, action, feedback and generally repetition. The present invention provides a means by which a simulation of such real steps is engaged in by users using a processing system apparatus. Users thereby learn, pre-train and/or are amused by the process of movement and its results.

The scope of application of the present invention includes any activity, real or otherwise, in which the user sends input controls to a processing system apparatus so as to control displayed images (and/or devices having motivity). The processing system apparatus is arranged such that inputs received from the user are converted into outputs displayed as user controllable images (and/or devices) executing movements as the personal, idiosyncratic, simulated agents of users.

Images (and/or devices) moving as such agents of users will perform simulated (and/or actual physical) movements that accomplish a desired result of the user. However, the apparatus is further arranged so that it executes desired, simulated (and/or physical) movements without requiring that the user execute anatomical, physical movements that are the same as those performed by the image (and/or device). Further, if a demonstrative image were to be displayed, the user is provided with means to have the user controllable image

interact with said demonstrative image without the requirement that the user make the same, anatomical, physical movement as made by the demonstrative image.

One technical effect achieved by the processing system apparatus is to provide the user with a means by which the user transfers his/her personal, idiosyncratic capabilities in the areas of decision-making, simulated motor skills and memory related to movement, to an open knowledge base of the processing system apparatus. The apparatus receives such inputs, processes and converts them into outputs, displayed as user controllable images so that said images, as constructed by the apparatus, perform in the user's fashion and with user-specific nuances, techniques and characteristics of performance.

Further, technical effects of the apparatus include the features of providing users with opportunities to review displayed movements so as to modify those movements, to add prior, or posterior synchronous movements, or to replace them with new movements and to add successive levels of movements which render the user controllable image capable of performing more complex simulated movements. Therefore, user controllable images acquire the user's "intelligence" in the form of simulated decision-making, motor skills and memory related to movement. Just as the user is enabled to change, modify, augment, and delete (and so forth) his/her movements in real life, without the use of the apparatus, the apparatus provides

a means by which the user may accomplish simulated functions in a simulated environment using user controllable images. In another embodiment of the invention the processing system apparatus is used in conjunction with robots, avatars and the like.

The processing system apparatus receives personal, idiosyncratic inputs from each user. Such inputs cause user controllable images to move in a user controlled fashion. These inputs may, at any point in time, be concurrent with, prior to or subsequent to other recorded inputs. This input supply to an open knowledge base will, as the user provides further inputs, represent modified user skill levels (as illustrated by displayed movements of the user controllable image), add new movement skills that are executed simultaneously with existing skills, add new skills movements that precede or follow other user skill movements and the like. The entire input process represents "building"/"modifying" components in the creation/maintenance of an idiosyncratic, open knowledge base within the processing system apparatus that is personal and specific to each individual user. In effect, the user with technical support from the present invention is "using", "learning from" and "playing with" his/her personal, idiosyncratic knowledge base as provided by the technical effects of the processing system apparatus. The apparatus provides user capability to create user-specific, updated visual effects from user-specific inputs.

The figures illustrate the invention as follows:

Detailed Description of the Drawings

FIG. 1 is an illustration of a user causing a user controllable image to perform a simulated physical movement.

FIG. 2 shows a single user using the invention. The user supplies inputs via a hand-held joystick to manipulate an adopted user controllable image on the right side of the screen to approximate movement of an image of an instructive, preprogrammed figure on the left side of the screen. The user views the preprogrammed image, recognizes what is being demonstrated, visualizes the performance of the maneuver, makes cognitive choices and decisions (including considering options) then manipulates the adopted user controllable image on the right side of the screen to achieve the instructed desired result.

FIG. 3 shows a user causing a user controllable image to emulate the movements of a demonstrative image using a virtual reality glove.

FIG. 4 illustrates the user controlling a user controllable image which displays approximately one half of a human body.

FIG. 5 shows another single user interfacing with the computer system of the invention. In this embodiment, the user, in a competitive setting, is in opposition to two preprogrammed images.

FIG. 6 is an illustration of a legless user controlling the displayed image of the legs of a user controllable image.

FIG. 7 shows an armless user controlling the arms of a user controllable image.

FIGs. 8A and 8B show two users using the invention simultaneously on two different computers which are networked together.

FIG. 9 is a schematic pictorial depiction of the invention being used by multiple users simultaneously with the systems being connected over the worldwide Internet.

FIG. 10 shows control of a previously living user controllable image entity.

FIG. 11 shows a user controllable image system entity.

FIG. 12 shows a user controllable image object entity.

FIG. 13 contains a block diagram, of one embodiment of the computer system 200 of the invention for simulating physical activities such as skating and hockey maneuvers and for entertainment use according to the present invention. The system comprises a central processing unit (CPU) 202 which can be, but is not limited to, a personal computer or handheld device. The CPU 202 is coupled to a display 204, such as a CRT screen, for displaying images and prompting the user for the input of information. The CPU 202 is also coupled to an input device or devices 206 such as a keyboard, joystick, etc., for the input of information from the user, an optional printer 208 for printing information such as player/student accomplishment information in hard-copy media and an optional network connection 209 for internet access and/or multi-user operation.

Input and output with the user can also be accomplished with virtual reality devices 207 such as a virtual reality glove and/or helmet worn by the user. A memory 210 is provided, coupled to the CPU 202, for the storage of program instructions, data and knowledge base recorded images and other information.

FIGs. 14A - 14F contain flowcharts which illustrate the logical flow of the computer system(s) used for the preparation and operation of the method of the present invention. FIG. 14A shows the procedure used for preparing the method to create/modify an entity to perform the simulated physical movements of the activity. Such preparation is performed upon a computer system 200 like, but not necessarily the same one as the computer system 200 used for operation of this processing system apparatus.

Step 400 requires the preparer, e.g. an instructor or coach or the like, usually not the same individual as the user referenced elsewhere, to enter into the processing system by identifying himself/herself. This identification is used for access verification/validation.

Step 401 requires the method to identify the entity being created. This may be any previously living thing, presently living thing, object, system or some fanciful entity. For the entity in question, the next step 402 creates (for a new entity) or retrieves (for an established old entity) a knowledge base describing the entity identified in the previous

step 401.

Step 403 creates characteristic parameters of the entity identified in step 401 and movements identified in step 404. These parameters are also given default (initial) values which the user may select to change at a later time. Parameters of the entity may include such things (where applicable) as size, weight, handedness, etc. Parameters of the movement(s) may include such things (where applicable) as number of fingers, finger size (related to entity size) and specific ability for movements (number of joints).

Step 404 is to identify the movements used to perform the simulated physical movements of the entity. These may be wholly new movements for the entity or refinements to previously created entity movements.

Step 405 creates (for a new entity movement) or retrieves (for an old entity movement) a knowledge base describing the entity movement identified in the previous step 404. This entity movement knowledge base is used by the processing system apparatus to provide form for and initialize content of the user-specific knowledge base of entity movement(s) until such time as each user has exercised this processing system apparatus to establish user-specific, idiosyncratic movement(s). This knowledge base of entity movement(s) is organized in a fashion similar to an orchestral music score or to a choreographic script describing the movements of a dance troupe.

Step 406 defines the combinations of movements which combine to perform the simulated, physical movements of the activity. Some (intra) movements relate to self relative movements of the entity (close the fingers into a fist) while other (inter) movements relate to external movements of the entity (strike something with a fist).

Step 408 defines pre-programmed movements along with their limits, such as the finger joint can move from 0 to 90 degrees (but not from -90 to 90 degrees). The user cannot later change these, though some limits may be specified as changeable parameters (Step 404).

Step 410 defines pre-stored movements such as (all) fingers close together at such and such a rate of closure. It is expected that the processing system will define pre-stored movements as the user reaches an exercise of specific simulated movement in his/her progression through the activity. Further exercise of the specific movement will allow the user to refine the pre-stored movement to the user's own idiosyncratical style.

Step 412 defines the means by which a proficiency measure for each movement may be made, e.g. the rate and degree to which closure of the fingers is achieved. In addition, overall proficiency measures are defined as summations of individual movement proficiency measures.

The last step 414 of creating/modifying an entity defines the methodology of combining the parameters, limits and

movements to construct the components by which the processing system can display image representing the resultant simulated movement. These components will be used to display all or part of the user controllable image, to perform the movement(s) and to present the display from an arbitrary point of view.

FIG. 14B shows the procedure used for operating the method of the present invention. Step 416 allows a user to enter into the processing system by identifying himself/herself. This identification is later used to identify the specific user's parameters and pre-stored movements, distinguishing the user from other users of the processing system method. If the user is new to the system, step 418, their user specific information is specified in step 420. In step 422 the user selects the environment (world) he/she will participate (what kind of entity bulldozer, microbe, living thing he/she wishes to be). In step 424, the user selects the form of instruction coached/taught/self directed, independent, cooperative with other user, intranet/internet accessed, etc.) he/she wishes.

In Step 426, the user selects the specific interactive simulated physical movement which is to become the object of the instructional session. For the activity, the user selects, in step 428, how the user wishes to participate in the activity. Step 430 allows the user to preview the (pre-programmed) model of the preferred performance of the activity. Step 432 allows the user to review the current level of achievement (pre-stored and pre-programmed) the user has

reached in the performance of the activity. Also provided to the user is a proficiency measure related to the idiosyncratic pre-stored simulated physical movements the user has previously demonstrated in the activity. Step 434 allows the user to perform the simulated physical movements of the activity so as to define or refined the idiosyncratic pre-stored simulated physical movements of the activity.

Step 436 allows the user to go back and change any of the earlier selections made by the user, e.g. go from coached to self directed study, or change the specified activity, etc. Also provided in step 436 would be the ability of the user to pause (a stop) to eat or take care of other individual needs.

FIG. 14C shows the procedure (sub-routine) of FIG. 14B Step 430 - the user selects to preview the (pre-programmed) model of the preferred performance of the simulated physical movements of the activity. For the duration of the preview session, step 438, the method performs the following steps (until completion or termination as indicated by the user). Some (optional) user inputs may be used to change the display point of view (position and/or orientation with respect to display axes) in step 439. This corresponds to moving and orienting the camera through which the user views the display.

In Step 440, a background image is retrieved/constructed to reflect the environment, multi-user situation and activity choices of the user. For each uci involved in the activity (as previously selected), step 442, the method performs the

following steps. Step 444 executes the pre-program of movements of the activity. Step 446 constructs a uci reflecting the pre-programmed movements by executing the defined methodology of preparation step 414. The resultant uci is displayed in step 448 (with the background from step 440 and other step 448 uci's). Where the total number of uci's have been included in the display, the preview continues with step 438. When the preview is complete, or complete to the user's satisfaction, step 438 terminates and any results (length of session, activity result measure (impact of striking fist), number of resultant movements, etc.) a summarized to the user in step 450. Method flow then reverts (returns) to FIG. 33B step 430.

FIG. 14D shows the procedure (sub-routine) of FIG. 14B step 432 - the user selects to review his/her current level of achievement (pre-stored and pre-programmed) the user has reached in the performance of the activity. For the duration of the review session, step 452, the method performs the following steps (until completion or termination is indicated by the user). Some (optional) user inputs may be used to change the display point of view (position and/or orientation with respect to display axes) in step 453. This corresponds to moving the camera through which the user views the display. In step 454, a background image is retrieved/constructed to reflect the environment, multi-user situation and activity choices of the user. For each uci involved in the activity (as

previously selected), step 456, the method performs the following steps. Step 458 executes the pre-programmed movements as modified by the user's idiosyncratic pre-stored movements of the activity. In step 460, the processing system accumulates a proficiency measure as defined in FIG. 33A step 412. Step 462 constructs a uci reflecting the pre-programmed controls as combined with the pre-stored movements in step 458. The resultant uci is displayed in step 464 (with the background from step 454 and other step 464 uci's). When the total number of uci's has been included in the display, the review continues with step 452. When the review is complete (or complete to the user's satisfaction), step 452 terminates and any results (length of session, proficiency measures, etc.) are summarized to the user in step 466. Method flow then reverts (returns) to FIG. 14B step 432.

FIG. 14E shows the procedure (sub-routine) of FIG. 14B step 434 - the user selects to perform (user inputs and pre-stored movements and pre-programmed controls) to define or refine his/her simulated physical movements. For the duration of the perform session, step 468, the method performs the following steps (until completion or termination as indicated by the user). Some (optional) user inputs may be used to change the display point of view (position and/or orientation with respect to display axes) in step 469. This corresponds to moving and orienting the camera through which the user views the display. In step 470, a background image is

retrieved/constructed to reflect the environment, multi-user situation and activity choices of the user. For each uci involved in the activity (as previously selected), step 472, the method performs the following steps. Step 474 executes the pre-programmed movements as modified by the user idiosyncratic pre-stored movements as modified/augmented by the user input controls. In step 476, the processing system accumulates a proficiency measure as defined in FIG. 33A step 412. Step 478 records the user input controls, uci movement(s) and proficiency measure in the memory means of the processor system. Step 480 constructs a uci reflecting the pre-programmed controls and the pre-stored movements as combined with the current user input controls in step 474. The resultant uci is displayed in step 482 (with the background from step 470 and other step 482 uci's). Where the total number of uci's has been included in the display, the perform session continues with step 468. When the performance session is complete (or complete to the user's satisfaction), step 468 terminates and any results (length of session, proficiency measure, proficiency measure improvement, etc.) are summarized to the user in step 484. In step 486, the resultant uci movements can be used to replace pre-stored default movements (FIG. 14A step 410) with the user's idiosyncratic movements (to define a new baseline of performance) the first time a user exercises the specific movement, or to refine the user's idiosyncratic pre-stored movement (history). The generalized

step of refining the user-specific pre-stored movements is to integrate the past pre-stored movements with the present transmitted user controls into future pre-stored movements. Algorithms for performing this refinement include (but is not limited to):

- maintaining user-specific pre-stored movement summary
- using full or truncated movement history
- using running or weighted averaging
- using best fit with/without discards
- using noise reduction
- using position and/or frequency smoothing
- using predictive/non-predictive techniques
- using established artificial techniques

Method flow then reverts (returns) to FIG. 14B step 434.

FIG. 14F details the procedure (sub-routine) of FIG. 14C Step 444, FIG. 14D step 458 and FIG. 14E step 474 - the combining of pre-programmed movements and pre-stored movements and user transmitted controls. For each user controllable image movement, as created in FIG. 14A step 404 and entered into the knowledge base of entity movement(s) in FIG. 14A step 405, the three contributions to entity movement are processed in priority order. First, if the user is exercising the user controllable image movement 490 with user input control(s) they are used to control the user controllable image movement 491. In the absence of current user input control(s) 492 a pre-stored summarization of past user controls (as entered into the

user-specific knowledge base of entity movement) 493. The summary of user-specific controls of user controllable image movements is maintained in FIG. 14E step 486 - define/refine pre-stored movements. In the absence of both current and past user input control(s) 494, the pre-programmed (control) movement(s) (as entered into the knowledge base for entity movement(s) in FIG. 14A step 405) are used to control the user controllable image movement 495. This step 495 reflects the condition of the processing system apparatus controlling entity movement when the user has not yet taken the opportunity to exercise that portion of the entity movement. In the absence of all controls, the entity movement is non present 496. When all user controllable image movement(s) have been controlled, the procedure (sub-routine) returns to FIG. 14D step 486.

Several versions of computer programs are encompassed by the present invention. Each version varies in complexity as each is directed toward a player/student at a different level of expertise. Versions developed for home, rink, and arcade use are instructional as well as entertaining. More complex versions for use in structured training facilities are developed. For each version, the computer system stores a series of lessons and corresponding "ideal" images in a database.

Claims

What is claimed is:

1. A method of operating a processing system apparatus to provide at least one user with at least one user controllable image for use in interactive, personal, idiosyncratic, simulated, physical movements, said method comprising the steps of:

generating, storing, and maintaining in a memory means of said processing system apparatus, at least one user controllable image responsive to inputs from said at least one user so as to perform said movements;

providing means to said processing system apparatus to receive inputs from said at least one user to control said at least one user controllable image;

constructing said user controllable image such that said user controllable image is controlled to perform said movements, instead of said at least one user performing corresponding actual physical movements;

recording and maintaining, in said memory means, a record of said user controllable image movements such that said record is modified to represent idiosyncratic movements as controlled by said inputs;

providing means to said processing system apparatus to send outputs of said user controllable image movements from said memory means to a display means.

2. The method of claim 1, further comprising said step of

accepting or rejecting said inputs.

3. The method of claim 1, wherein said maintained record is modified by subsequent user controllable image movements as controlled by said at least one user.

4. The method of claim 1, wherein said maintained record is synchronously augmented by subsequent user controllable image movements as controlled by said at least one user.

5. The method of claim 1, wherein said maintained record is retained as antecedent user controllable image movements that are sequentially added by subsequent user controllable image movements as controlled by said at least one user.

6. The method of claim 1, further comprising said step of allowing said at least one user to select to review said user controllable image movements from said maintained records.

7. The method of claim 1, further comprising said step of receiving input to provide selected, characteristic parameters of said user controllable image.

8. The method of claim 1, further comprising said step of receiving input to select the displayed speed of movement of said user controllable image.

9. The method of claim 1, wherein said user controllable image movements are restricted by pre-programmed movement limits such that said user controllable image performs said movements within the boundaries of said pre-programmed movement limits.

10. The method of claim 1, wherein said user controllable image movements are measured by said processing system apparatus with respect to an established model of preferred movements.

11. The method of claim 10, wherein said steps are repeated so that said measurements indicate said at least one user's level of improvement in attaining said preferred movements.

12. The method of claim 1, wherein said step of providing input means does not require said at least one user to move the same or any related part of said user's anatomy.

13. The method of claim 1, wherein said step of providing input means further comprises the steps of:

providing input means to allow said at least one user to specify the position of said user controllable image with respect to any axis; and

providing input means to allow said at least one user to specify the orientation of said user controllable image with respect to any axis.

14. The method of claim 1, wherein said step of constructing the user controllable image such that its movements are derived from at least one of said user input controls, pre-stored idiosyncratic movements and pre-programmed controls.

15. The method of claim 1, further comprising said step of providing input means to control said at least one user controllable image so as to perform demonstrative, simulated physical movements.

16. The method of claim 15, further comprising at least one additional user controllable image to interact with said demonstrative movements.

17. The method of claim 1, wherein said step of constructing said user controllable images further comprises input means by which at least two user controllable images interact with each other.

18. The method of claim 1, wherein said step of display means of said user controllable image comprises using recorded video images.

19. The method of claim 1, wherein said step of display means of said user controllable image comprises using live video images.

20. A method of operating a processing system apparatus to provide at least one user with at least one demonstrative image and at least one user controllable image for use in interactive, personal, idiosyncratic, simulated, physical movements, said method comprising the steps of:

generating and storing in a memory means of said processing system apparatus, at least one sequence of demonstrative images, wherein said at least one sequence of demonstrative images comprises a series of demonstrative performance of an activity representing physical movements;

further generating, storing, and maintaining in said memory means of said processing system, at least one user controllable image controlled by inputs from said at least one

user so as to perform said movements;

providing means to said processing system apparatus to display an image of said sequence of demonstrative images on a display means of said processing system apparatus;

providing means to said processing system apparatus to receive inputs from said at least one user to control said at least one user controllable image;

constructing said user controllable image such that said user controllable image is controlled to perform said movements, instead of said at least one user performing corresponding actual physical movements;

recording and maintaining, in said memory means, a record of said user controllable image movements such that said record is modified to represent idiosyncratic movements as controlled by said inputs;

providing means to said processing system apparatus to send outputs of said user controllable image movements from said memory means to said display means with said displayed image of said sequence of demonstrative images.

21. A method of operating a processing system apparatus to provide at least one user with at least one user controllable device to perform interactive, personal, idiosyncratic, physical movements, said method comprising the steps of:

generating, storing, and maintaining in a memory means of said processing system apparatus, at least one user controllable model responsive to inputs from said at least one

user so as to cause said device to perform interactive, personal, idiosyncratic, simulated, physical movements;

providing means to said processing system apparatus to receive inputs from said at least one user to control said at least one user controllable device;

constructing said user controllable model such that said user controllable device is controlled to perform said movements, instead of said at least one user performing corresponding, actual, physical movements;

recording and maintaining, in said memory means, a record of said user controllable device movements such that said record is modified to represent idiosyncratic movements as controlled by said inputs;

providing means to said processing system apparatus to send outputs representing said user controllable device movements from said memory means to said user controllable device.

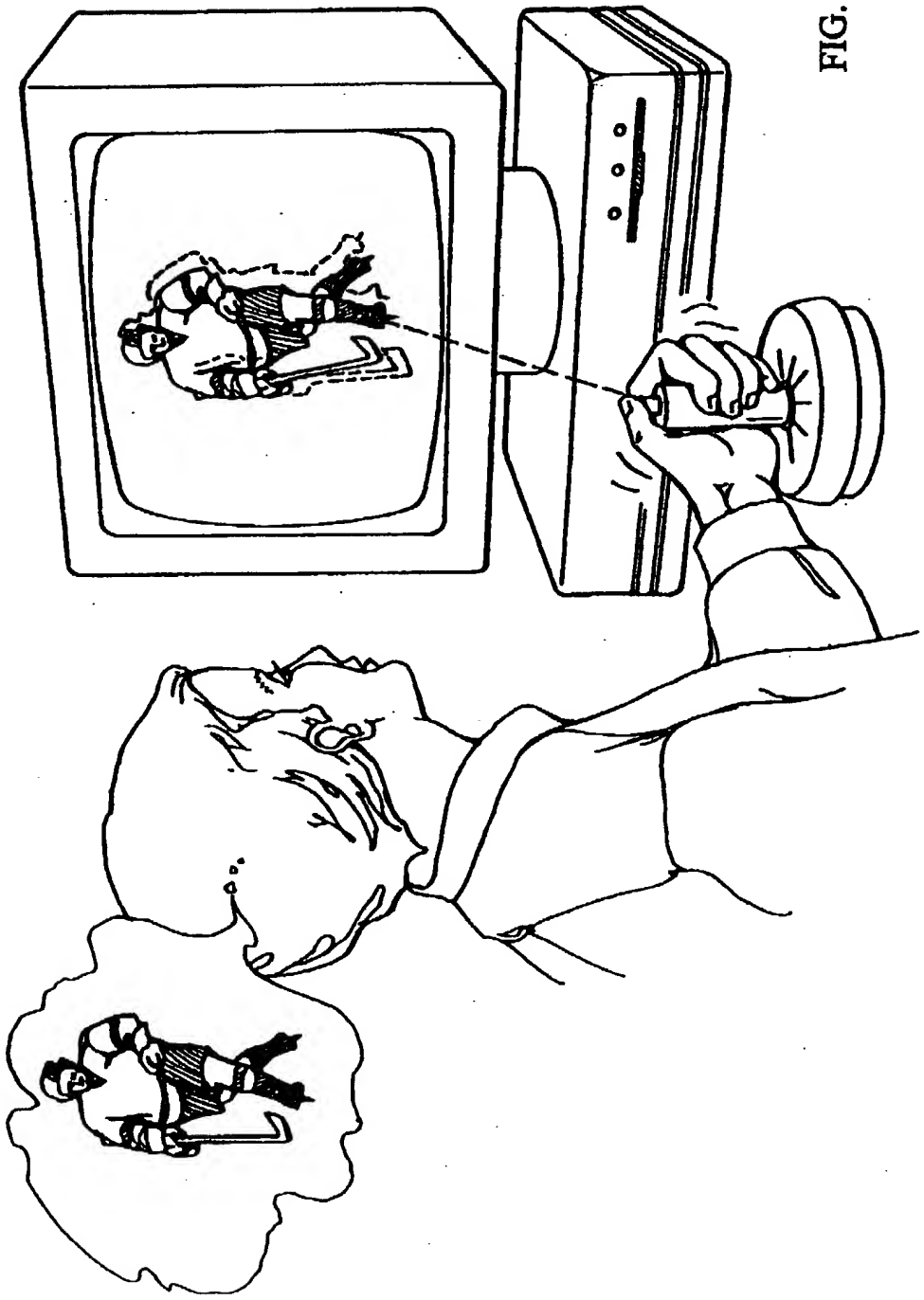

FIG. 1

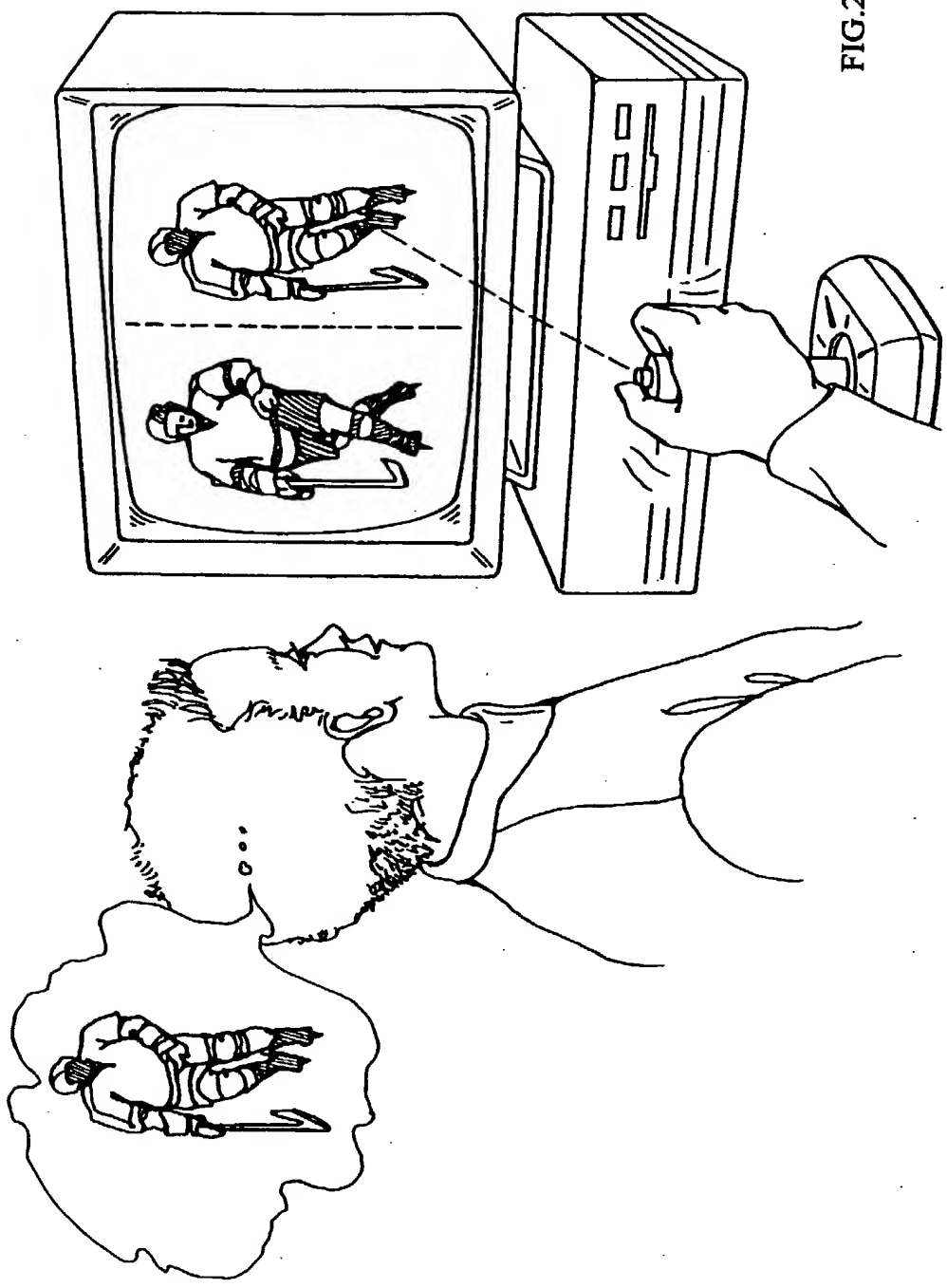

FIG.2

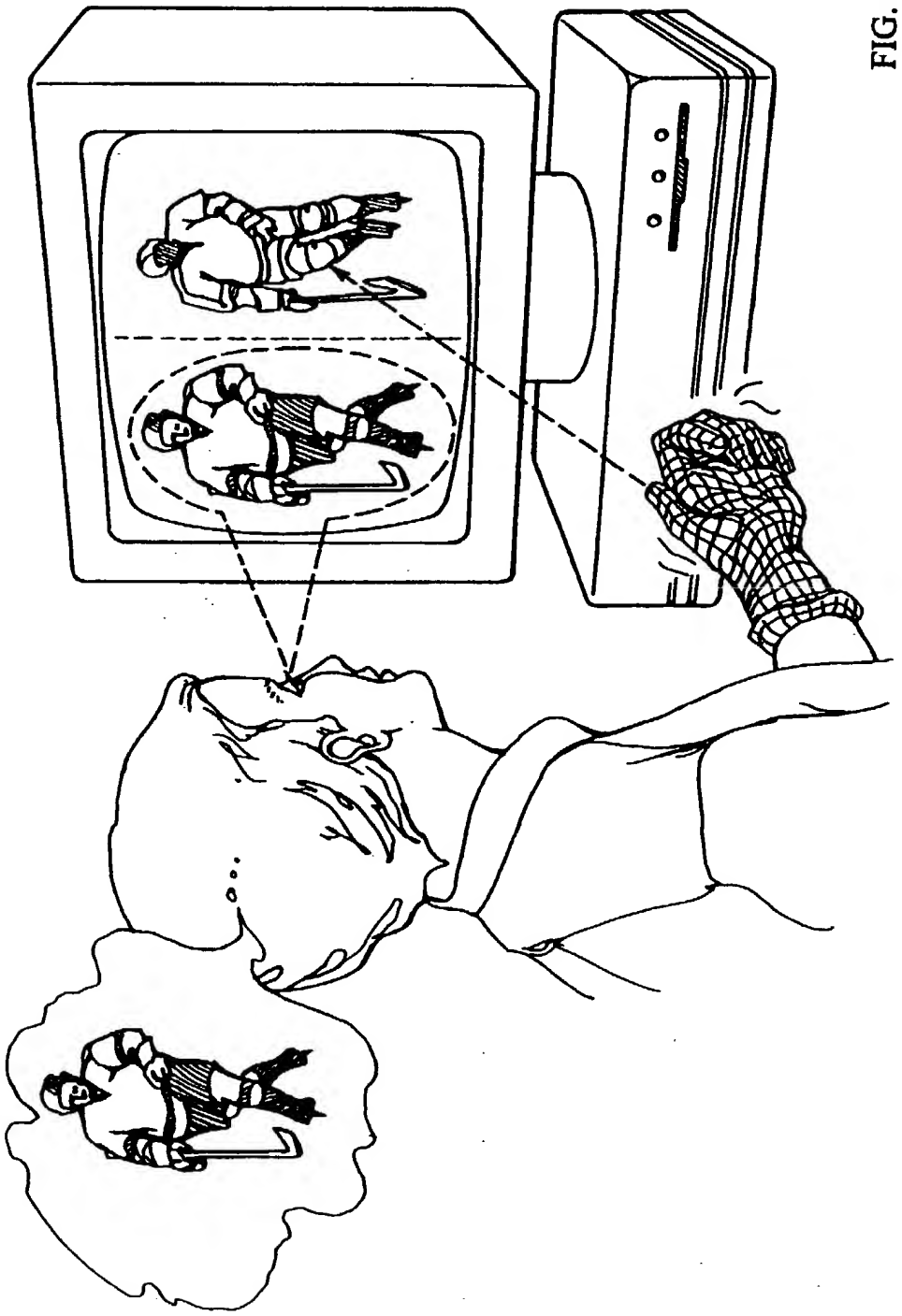

FIG. 3

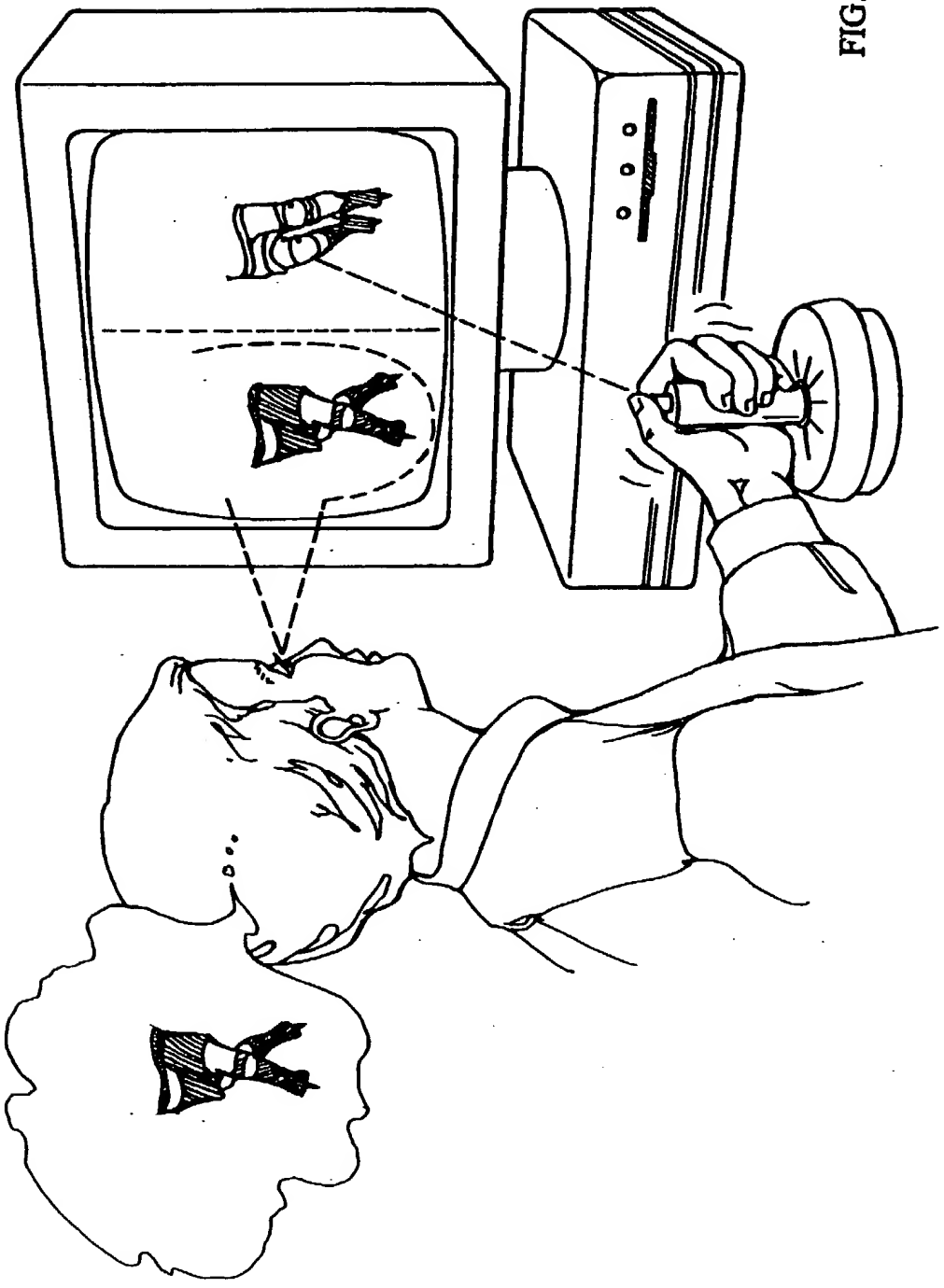

FIG. 4

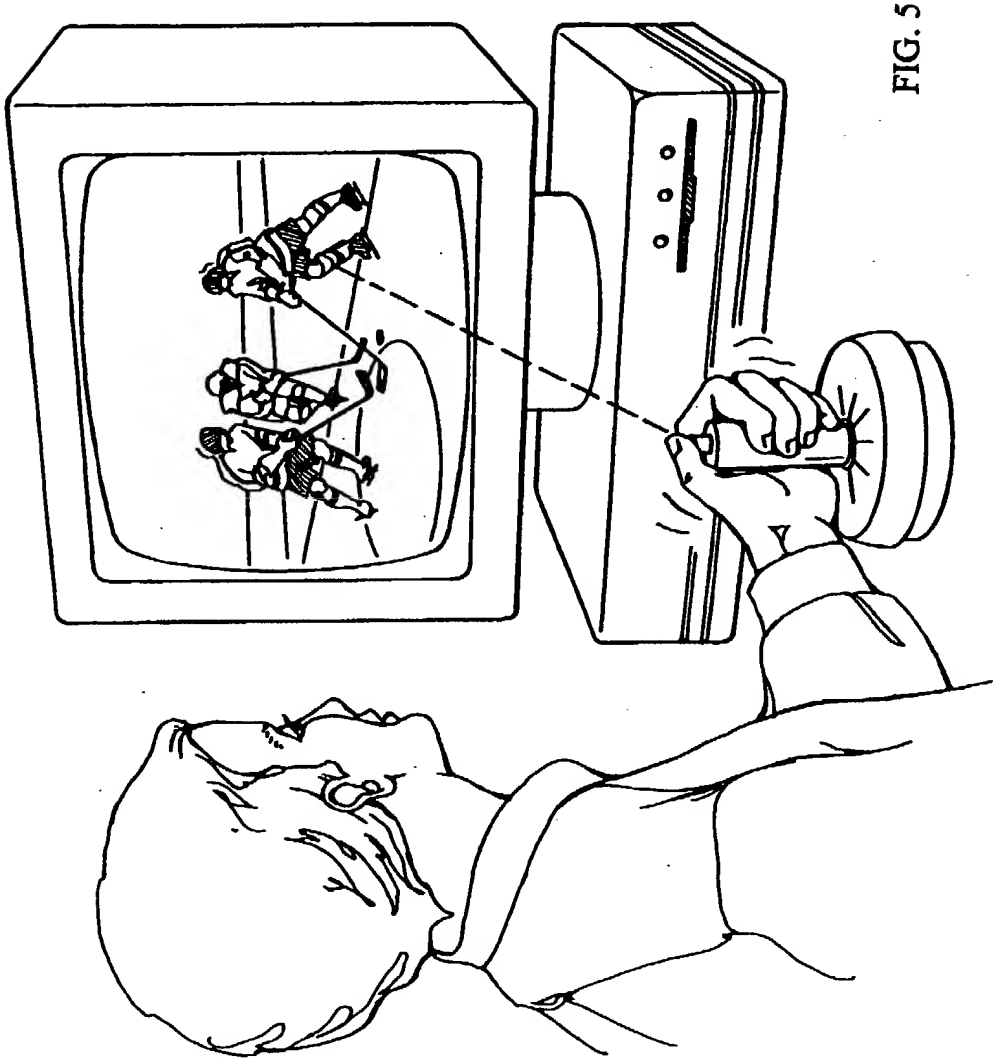

FIG. 5

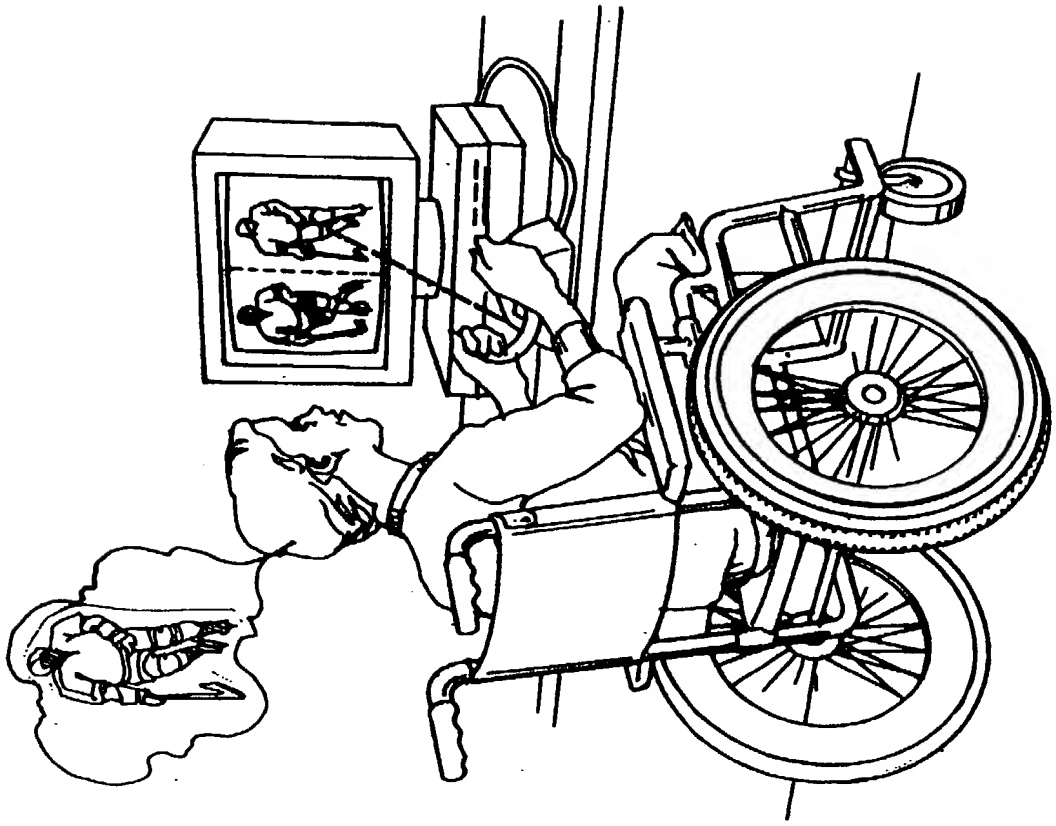

FIG. 6

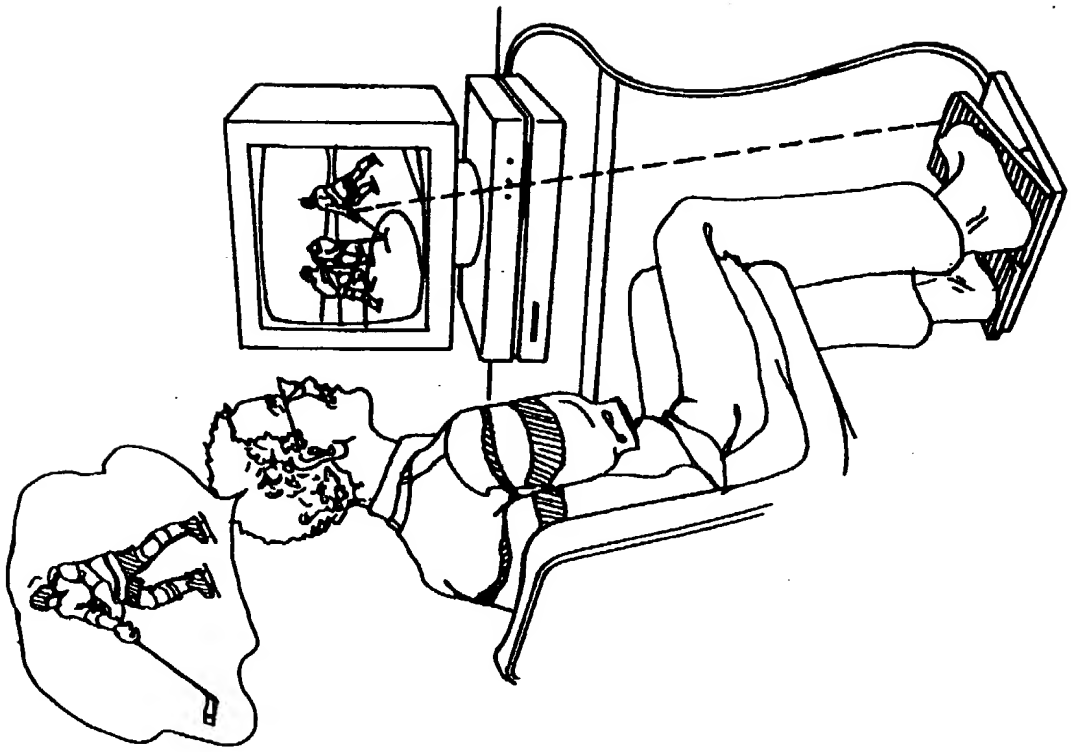

FIG. 7

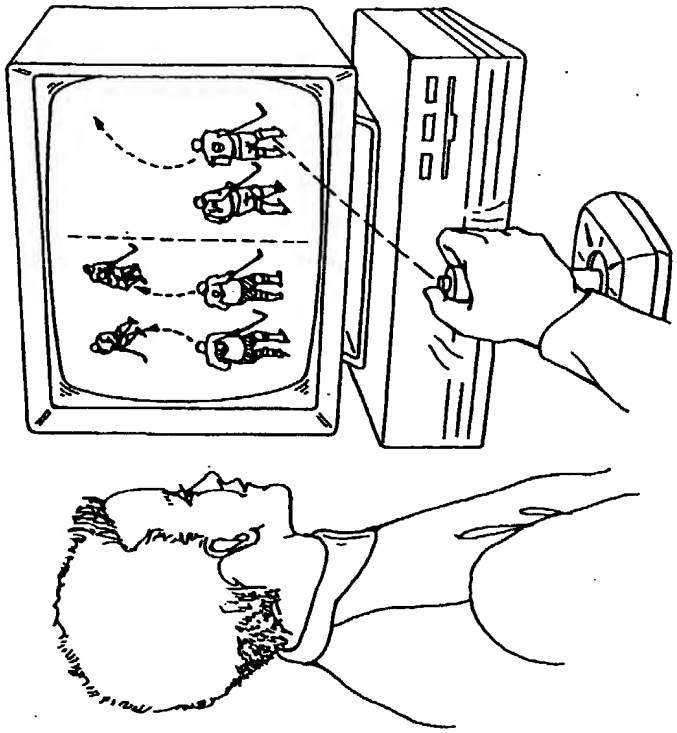

FIG. 8B

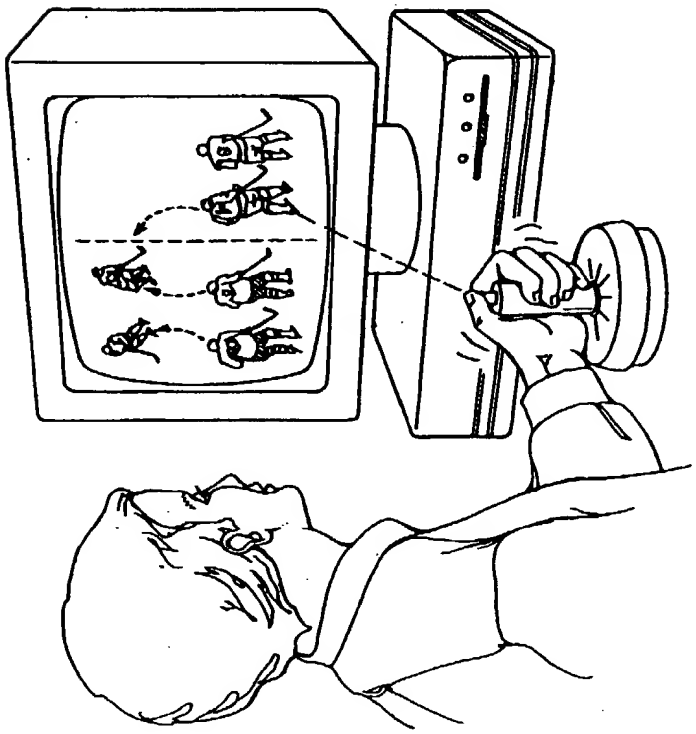

FIG. 8A

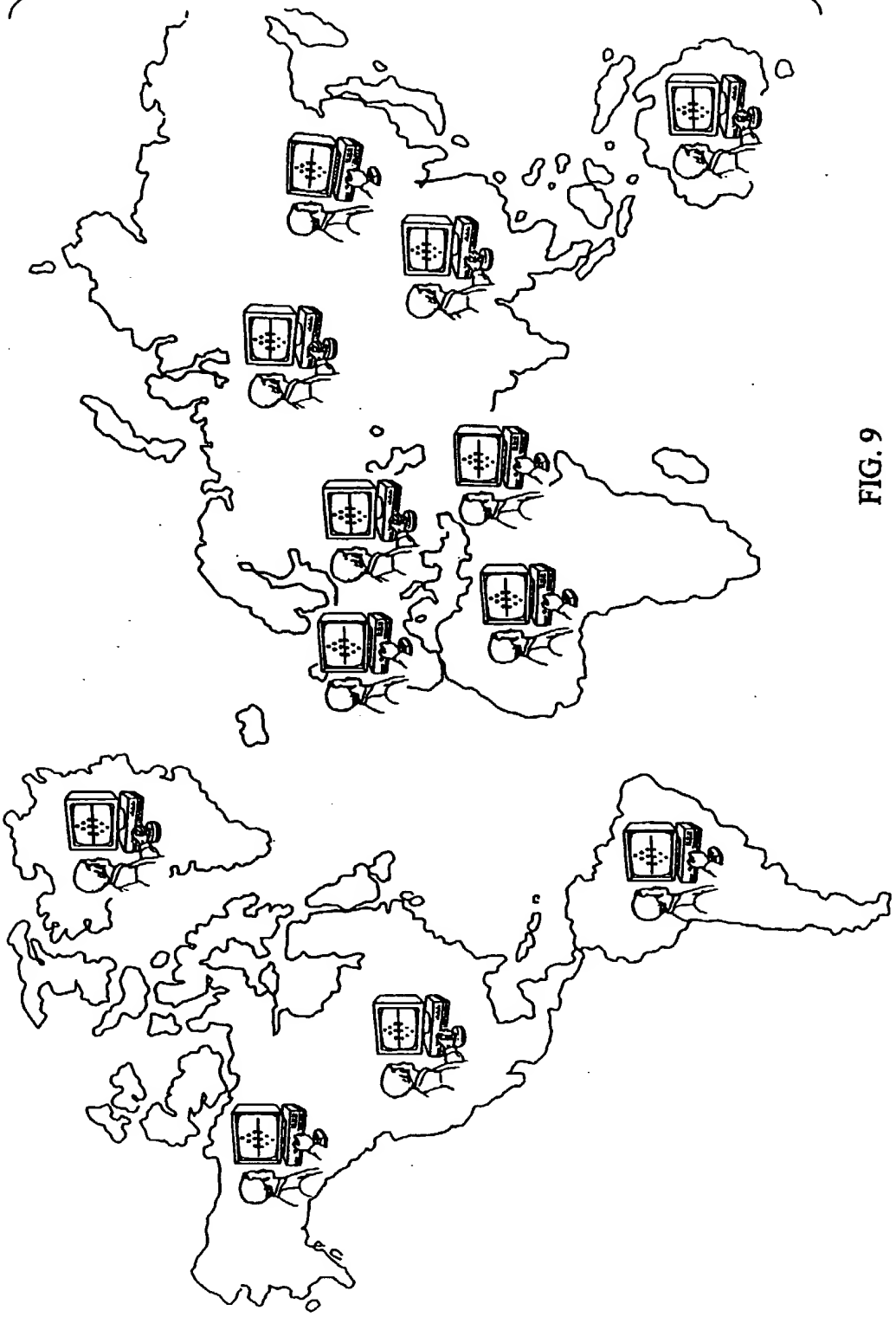

FIG. 9

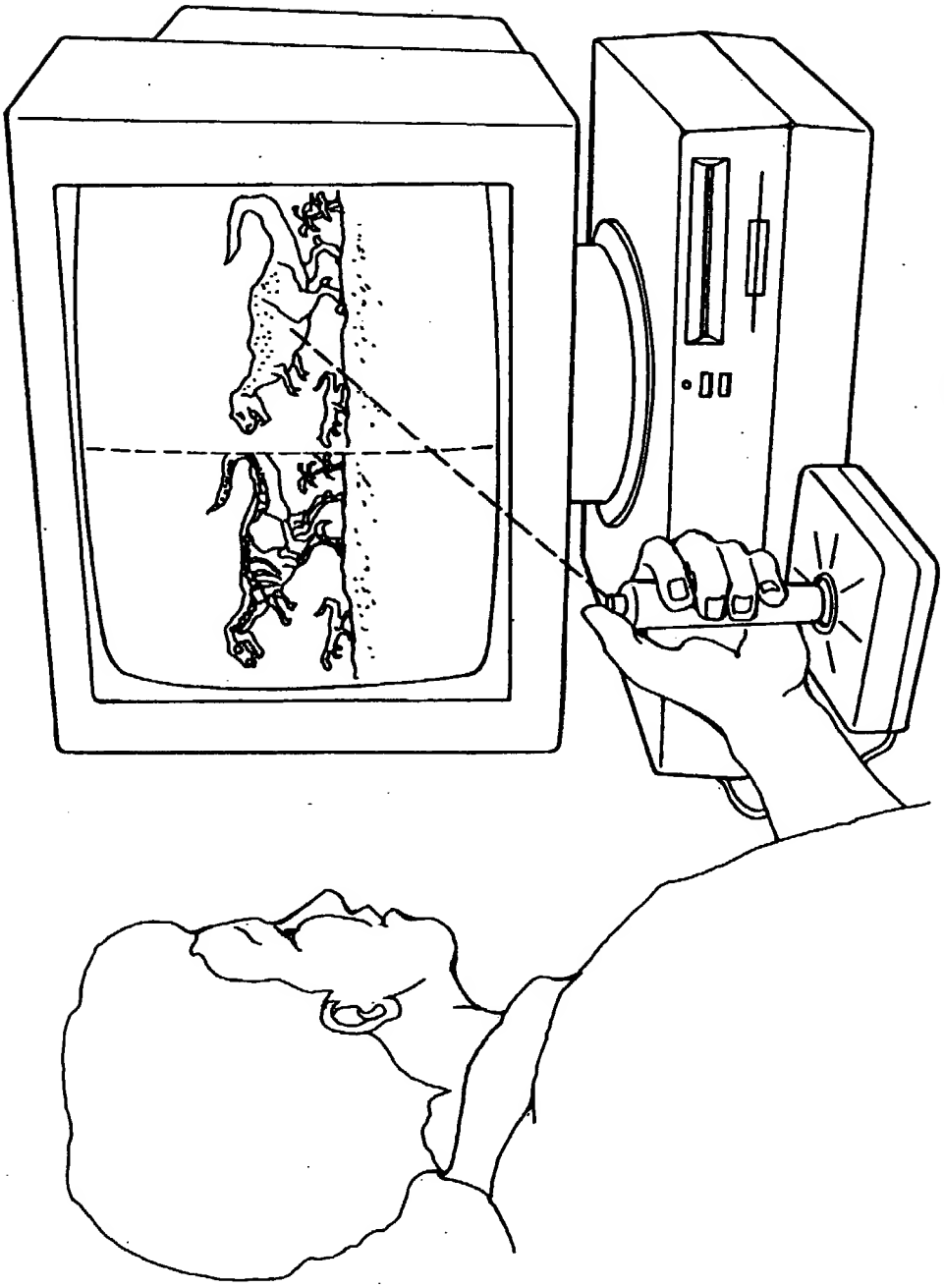

FIG. 10

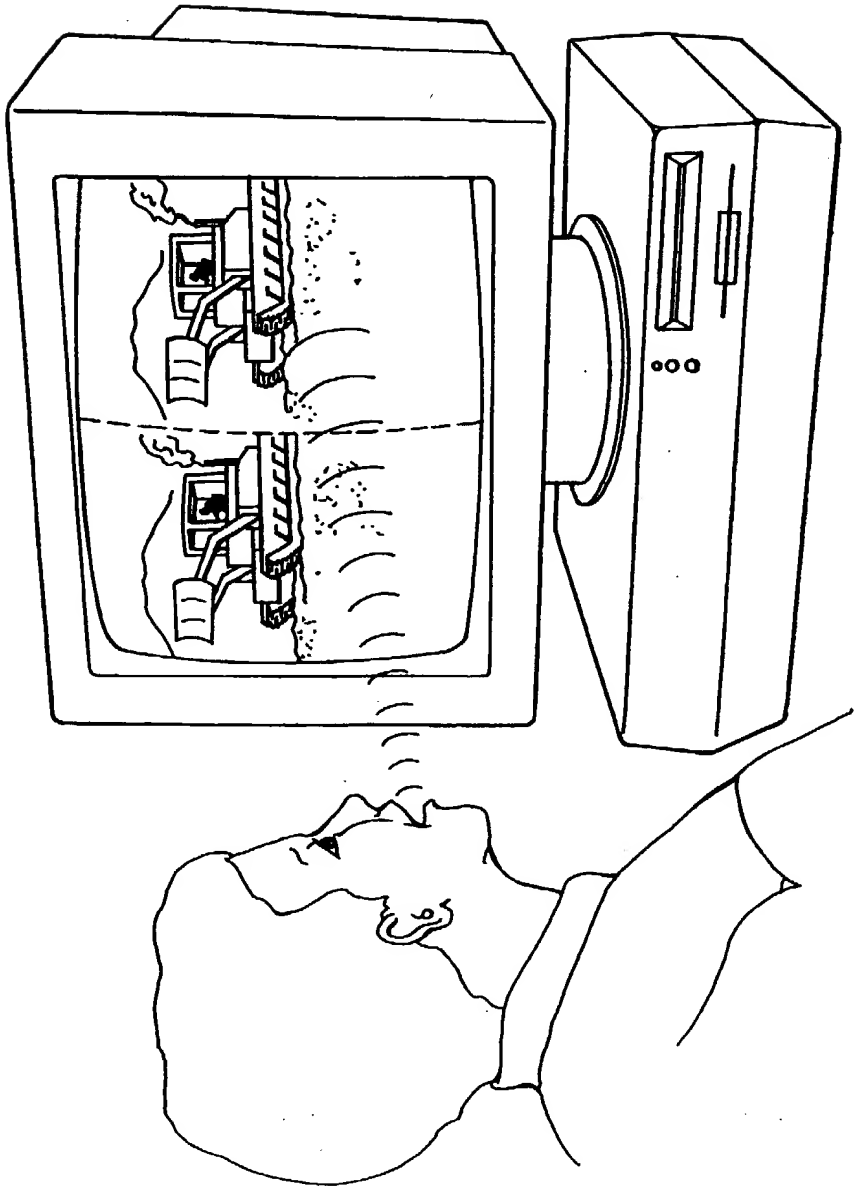

FIG. 11

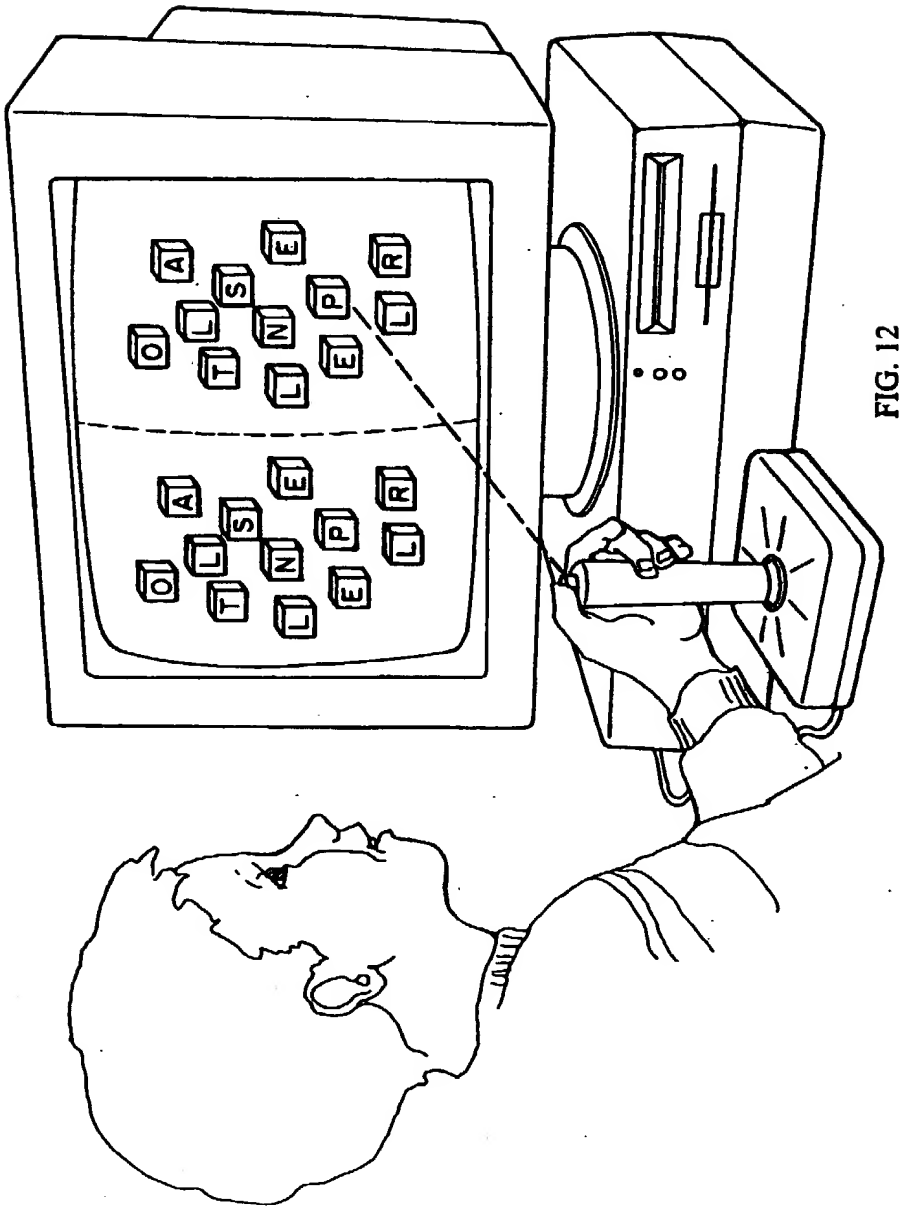

FIG. 12

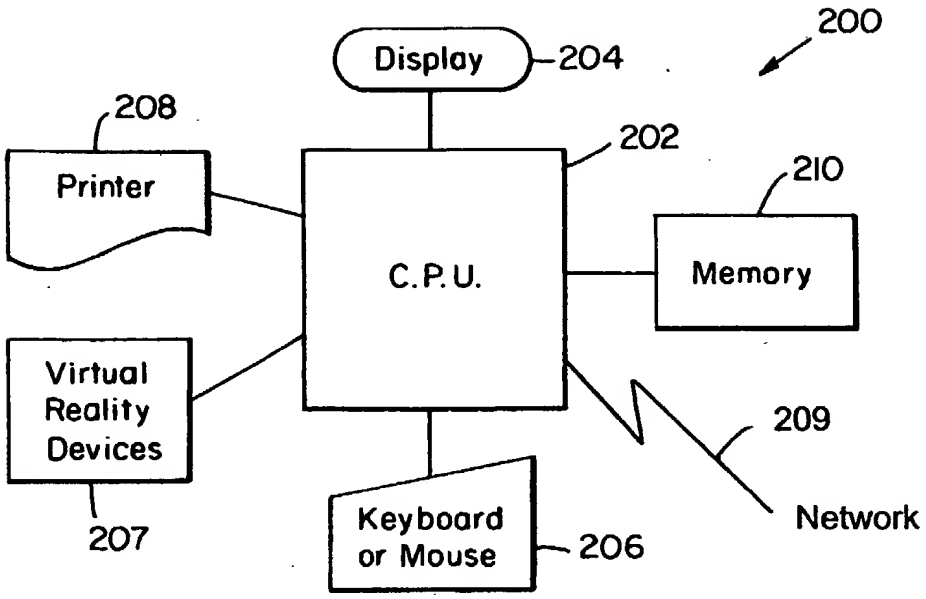
200
Display
204
208
202
Printer
210
C.P.U.
Memory
Virtual
Reality
Devices
209
Network
207
Keyboard
or Mouse
206

FIG. 13

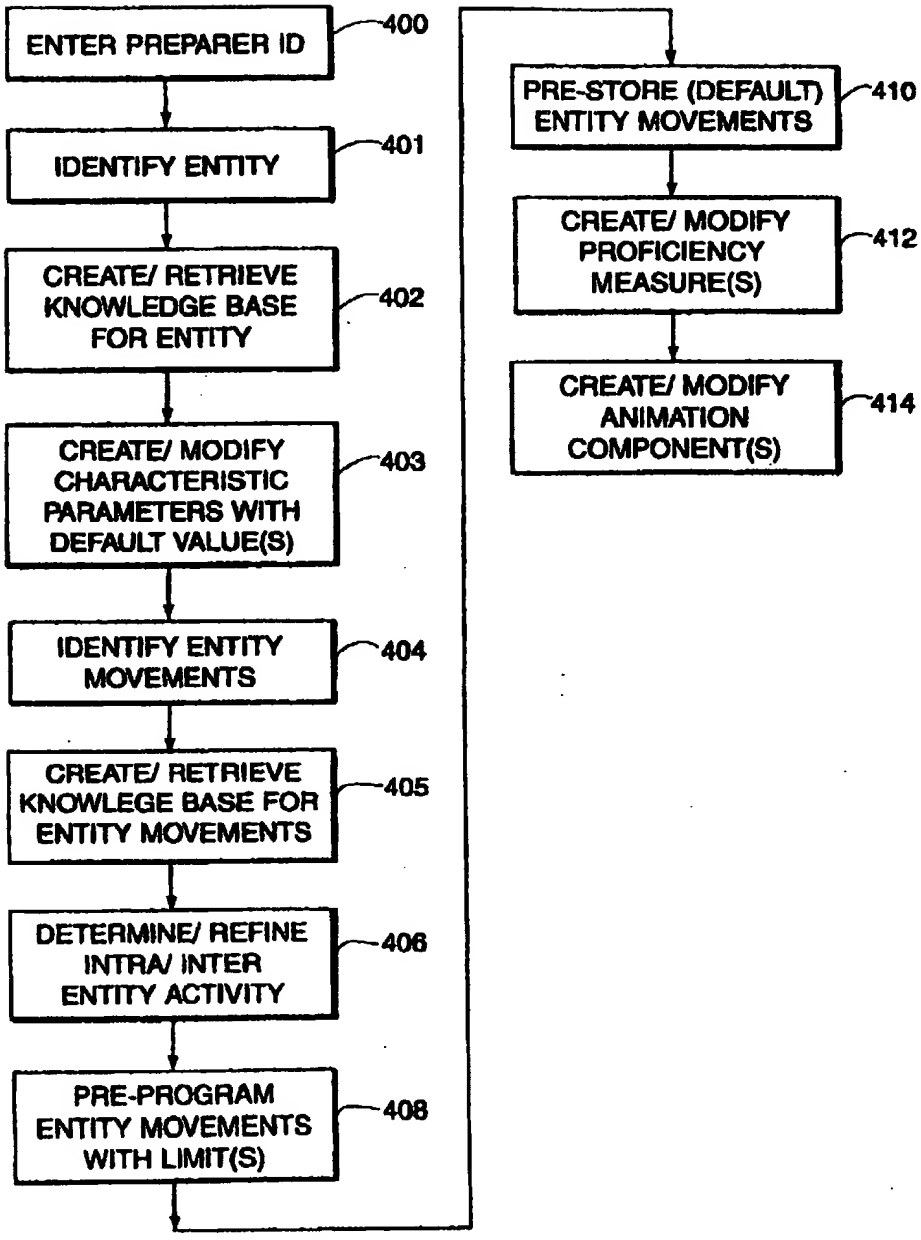
ENTER PREPARER ID
400
IDENTIFY ENTITY
401
CREATE/ RETRIEVE KNOWLEDGE BASE FOR ENTITY
402
CREATE/ MODIFY CHARACTERISTIC PARAMETERS WITH DEFAULT VALUE(S)
403
IDENTIFY ENTITY MOVEMENTS
404
CREATE/ RETRIEVE KNOWLEGE BASE FOR ENTITY MOVEMENTS
405
DETERMINE/ REFINE INTRA/ INTER ENTITY ACTIVITY
406
PRE-PROGRAM ENTITY MOVEMENTS WITH LIMIT(S)
408
PRE-STORE (DEFAULT) ENTITY MOVEMENTS
410
CREATE/ MODIFY PROFICIENCY MEASURE(S)
412
CREATE/ MODIFY ANIMATION COMPONENT(S)
414

FIG. 14A

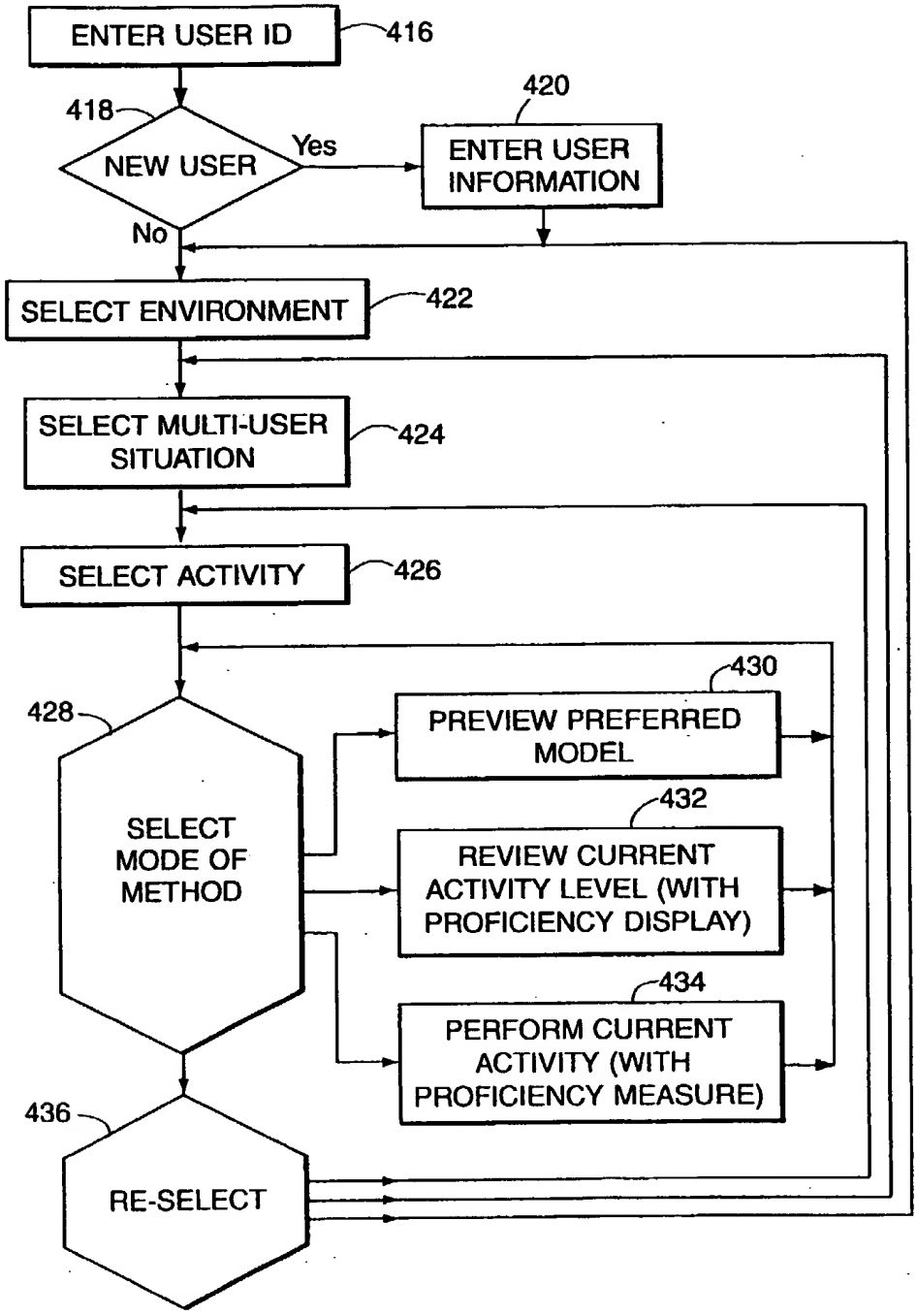
ENTER USER ID
416
418
NEW USER
Yes
420
ENTER USER INFORMATION
No
SELECT ENVIRONMENT
422
SELECT MULTI-USER SITUATION
424
SELECT ACTIVITY
426
428
SELECT MODE OF METHOD
430
PREVIEW PREFERRED MODEL
432
REVIEW CURRENT ACTIVITY LEVEL (WITH PROFICIENCY DISPLAY)
434
PERFORM CURRENT ACTIVITY (WITH PROFICIENCY MEASURE)
436
RE-SELECT

FIG. 14B

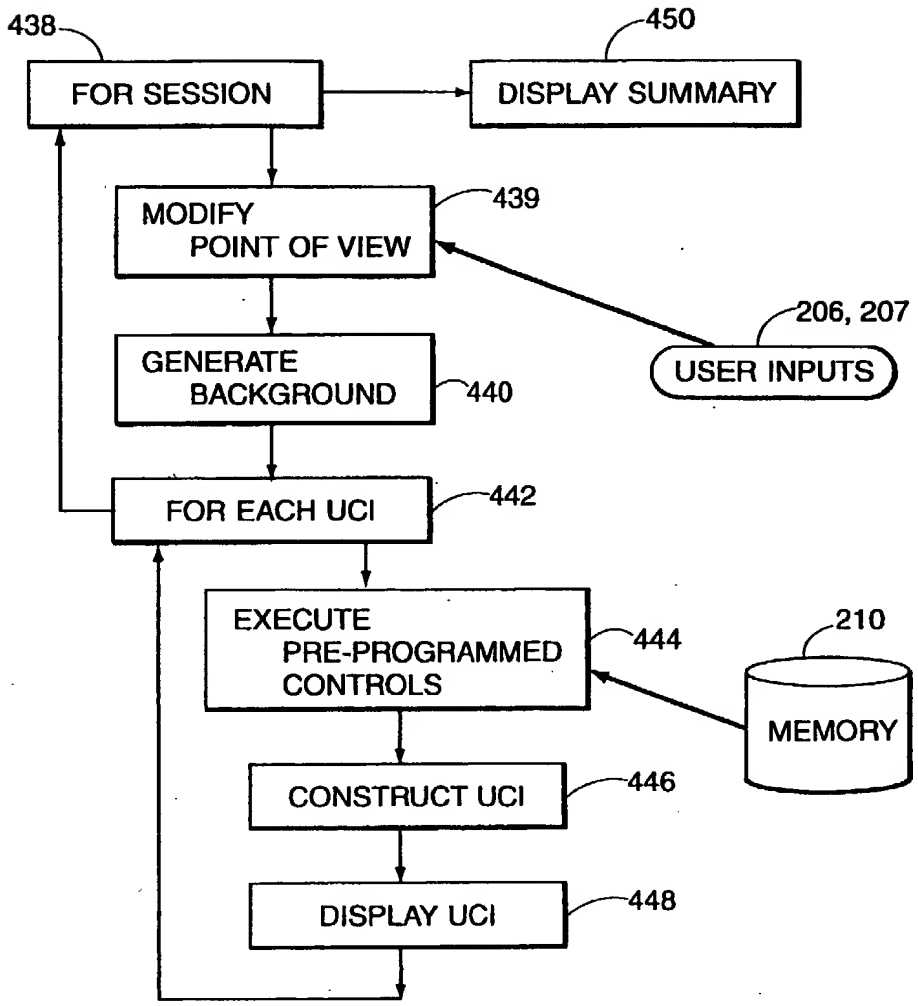
438
FOR SESSION
450
DISPLAY SUMMARY
MODIFY POINT OF VIEW
439
206, 207
USER INPUTS
GENERATE BACKGROUND
440
FOR EACH UCI
442
EXECUTE PRE-PROGRAMMED CONTROLS
444
210
MEMORY
CONSTRUCT UCI
446
DISPLAY UCI
448

FIG. 14C

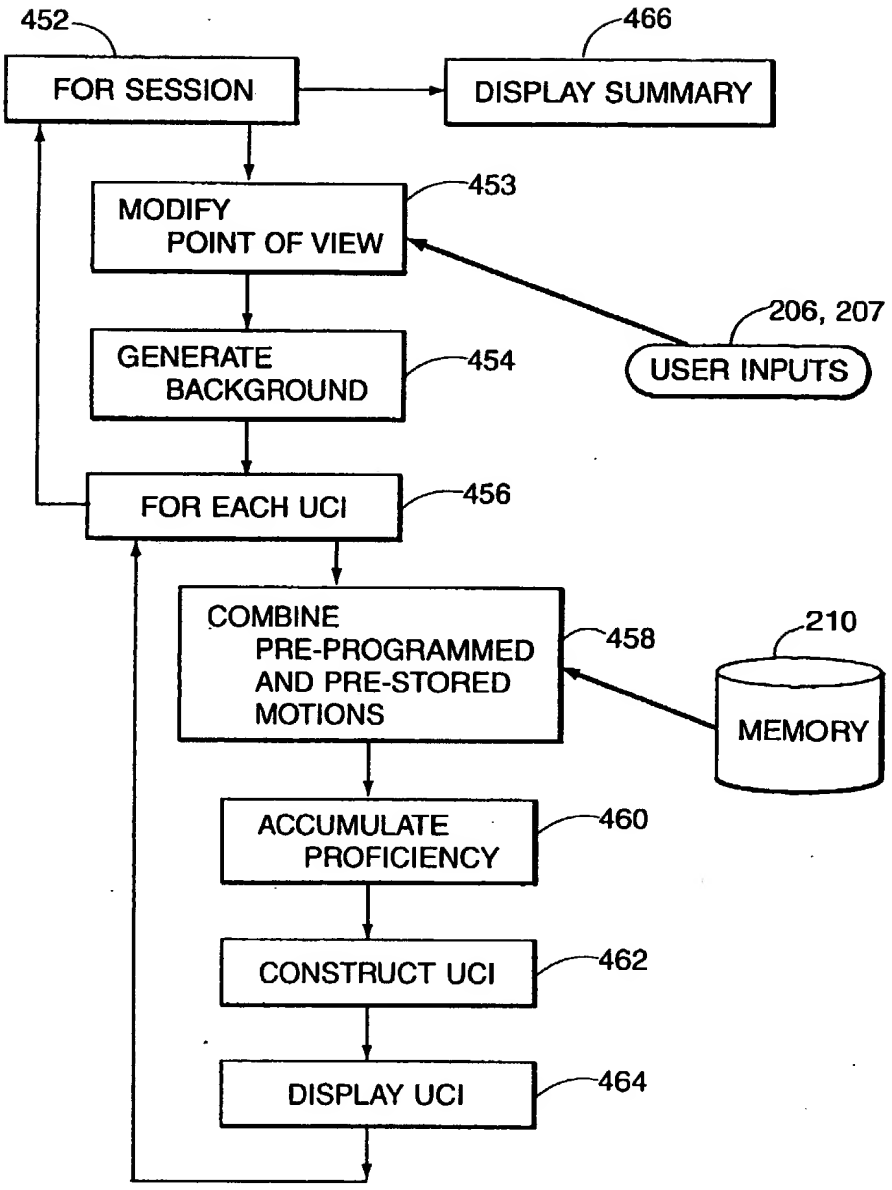
452
FOR SESSION
466
DISPLAY SUMMARY
MODIFY POINT OF VIEW
453
206, 207
USER INPUTS
GENERATE BACKGROUND
454
FOR EACH UCI
456
COMBINE PRE-PROGRAMMED AND PRE-STORED MOTIONS
458
210
MEMORY
ACCUMULATE PROFICIENCY
460
CONSTRUCT UCI
462
DISPLAY UCI
464

FIG. 14D

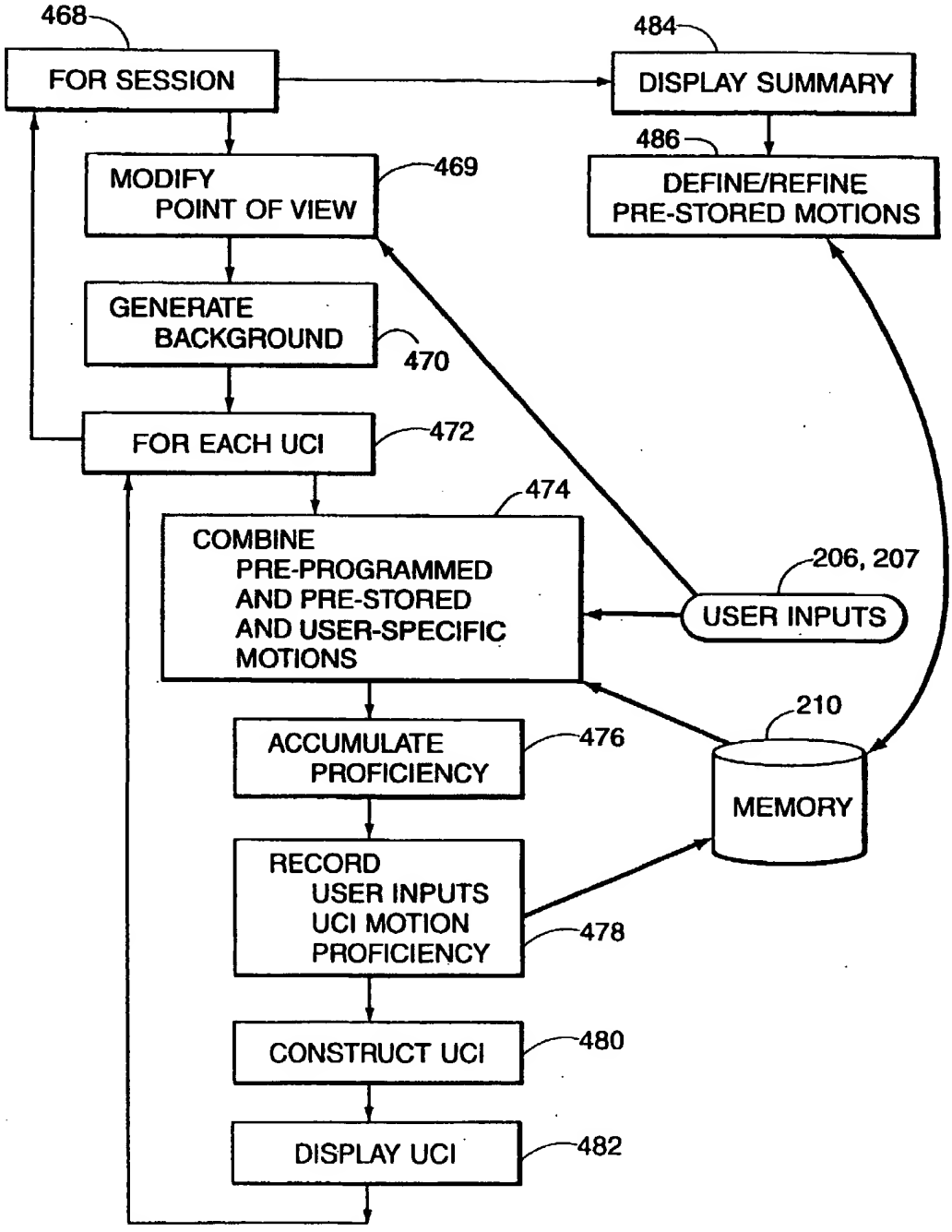
468
FOR SESSION
484
DISPLAY SUMMARY
486
DEFINE/REFINE PRE-STORED MOTIONS
MODIFY POINT OF VIEW
469
GENERATE BACKGROUND
470
FOR EACH UCI
472
474
COMBINE PRE-PROGRAMMED AND PRE-STORED AND USER-SPECIFIC MOTIONS
206, 207
USER INPUTS
210
MEMORY
ACCUMULATE PROFICIENCY
476
RECORD USER INPUTS UCI MOTION PROFICIENCY
478
CONSTRUCT UCI
480
DISPLAY UCI
482

FIG. 14E

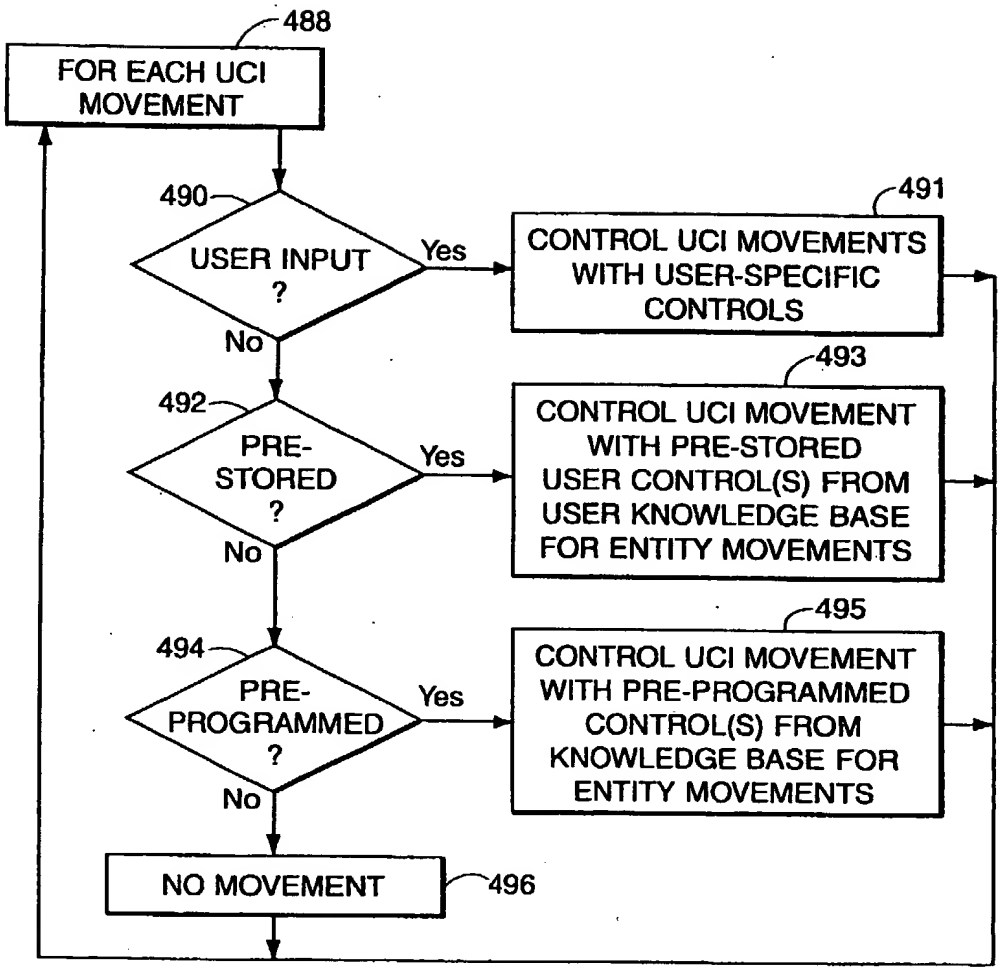
488
FOR EACH UCI MOVEMENT
490
USER INPUT ?
Yes
No
491
CONTROL UCI MOVEMENTS WITH USER-SPECIFIC CONTROLS
492
PRE-STORED ?
Yes
No
493
CONTROL UCI MOVEMENT WITH PRE-STORED USER CONTROL(S) FROM USER KNOWLEDGE BASE FOR ENTITY MOVEMENTS
494
PRE-PROGRAMMED ?
Yes
No
495
CONTROL UCI MOVEMENT WITH PRE-PROGRAMMED CONTROL(S) FROM KNOWLEDGE BASE FOR ENTITY MOVEMENTS
NO MOVEMENT
496

FIG. 14F

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/01686

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 317 505 A (SARDARIANI EDMOND ET AL) 31 May 1994 (1994-05-31) abstract column 8, line 66 -column 10, line 64	1,20,21
A	US 5 729 220 A (RUSSELL DAVID C) 17 March 1998 (1998-03-17) abstract column 8, line 64 -column 9, line 14	1,20,21

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 February 2001	09/02/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Baldan, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter[redacted]nal Application No
PCT/GB 00/01686

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5317505 A	31-05-1994	AU 9175691 A	22-07-1992
		WO 9211592 A	09-07-1992
US 5729220 A	17-03-1998	US 5481265 A	02-01-1996
		AU 7788191 A	13-06-1991
		EP 0500794 A	02-09-1992
		JP 5502130 T	15-04-1993
		WO 9107826 A	30-05-1991